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Chapters 1, 2, 4, and 6

Name and Title	Education and Professional Experience	Affiliation	Contribution
Lola M. Abshire, Regional NEPA Coordinator	B.S., Natural Resources Management, University of Arizona 28 years experience in resource manage- ment and environ- mental compliance	Bureau of Reclamation	NEPA guidance, document review, filing
Patty Alexander, Technical Editor	A.A., English (in progress), Red Rocks Community College Diploma of Theology, Golden Gate Seminary, San Francisco (in progress) 23 years experience editing and desktop publishing environ- mental compliance documents	Bureau of Reclamation	Technical editing, design, desktop publishing
Robert Aukerman, Contractor	B.S., Parks and Recreation Administration and Planning, Pennsylvania State University M.S., Ph.D., Recreation and Parks Administration and Planning 40 years experience in recreation and tourism planning and management	Bureau of Reclamation Contractor, Aukerman, Haas, and Associates, LLC	Recreational resources analysis
Susan Black, Social Science Analyst	B.A., Economics, St. Martin's University 23 years experience in water resources planning, environ- mental compliance, social analysis, and public involvement	Bureau of Reclamation	Public health analysis (hazardous and toxic materials) Indian trust assets analysis Environmental justice analysis

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Name and Title	Education and Professional Experience	Affiliation	Contribution
Levi Brekke, Civil Engineer	<p>B.S., Civil Engineering, University of Iowa</p> <p>M.S., Environmental Science and Engineering, Stanford University</p> <p>Ph.D., Civil Engineering, University of California, Berkeley</p> <p>10 years experience in environmental and water resources engineering</p>	Bureau of Reclamation	Climate change analysis
Wendy Christensen, Civil Engineer/ Assistant Storage Study Manager	<p>B.S., Civil Engineering, Colorado State University</p> <p>Master Degree, Engineering Management, Washington State University</p> <p>17 years experience in civil engineering</p>	Bureau of Reclamation	Storage Study coordination and document review; Joint Alternatives analysis
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List of Preparers

Name and Title	Education and Professional Experience	Affiliation	Contribution
Mark DeLeon, Archaeologist	B.A., University of Alabama, Anthropology M.S., University of Southern Mississippi, Anthropology 30 years experience in Federal historic preservation programs and cultural resource management	Bureau of Reclamation	Historic properties analysis Indian sacred sites analysis State Historic Preservation Officer consultation Native American Graves Protection and Repatriation Act consultation
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John Evans, Environmental Protection Specialist	B.A., International Development, The Evergreen State College 24 years NEPA and natural resources management	Bureau of Reclamation	Water resources analysis Vegetation and wildlife analyses Threatened and endangered species analysis Agency, Tribal, and protection of wetlands coordination and consultation

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Name and Title	Education and Professional Experience	Affiliation	Contribution
Glenn E. Haas, Contractor	B.S., Forestry, Pennsylvania State University M.S., Recreation and Parks Administration, Pennsylvania State University Ph.D., Natural Resources, Recreation and Tourism, Colorado State University Extensive experience in recreation planning and management	Bureau of Reclamation Contractor, Aukerman, Haas, and Associates, LLC	Recreational resources analysis
Steve Hiebert, Fisheries Biologist	B.S., Fisheries, College of Agriculture, New Mexico State University 27 years experience in fishery science	Bureau of Reclamation	Fisheries, false attraction, temperature, and fish screening analyses
Rob Hilldale, Civil Engineer, PE	B.S. and M.S., Civil Engineering, specializing in sediment transport and river mechanics, Washington State University 7 years experience	Bureau of Reclamation	Sediment resource analysis
Gina Hoff, Water Quality Specialist/Physical Scientist	B.S., Microbiology, Central Washington University 5 years experience	Bureau of Reclamation	Water quality analysis
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Name and Title	Education and Professional Experience	Affiliation	Contribution
David Kaumheimer, Environmental Programs Manager	B.S., Wildlife Ecology, University of Wisconsin M.S., Wildlife Management, University of Idaho 25 years experience	Bureau of Reclamation	Storage Study oversight
Marlene Johnson, Assistant Resource Manager	Associate of Business Administration, University of Denver 21 years experience in editing and project management	Bureau of Reclamation	Resource management assistance
Dave King, Hydraulic Engineer	B.S., Agricultural Engineering, The Ohio State University M.S., Agricultural Engineering, University of Idaho 31 years experience in operation and maintenance of water systems	Bureau of Reclamation	Development of data management system to process data from hydrologic model and various other models into EDT databases
Patrick Mangan, Technical Service Center Team Leader	B.S., Forestry and Soil Science, University of Wisconsin M.S., Water Resources, University of Wisconsin 25 years experience as fisheries biologist	Bureau of Reclamation	Threatened and endangered species analysis Air quality analysis Noise analysis Relationship between short-term and long- term productivity analysis Irreversible and irretrievable commitments of resources analysis
Teri Manross, Technical Editor	A.A., English/Psychology (in progress), Red Rocks Community College 16 years experience editing and desktop publishing environ- mental compliance documents	Bureau of Reclamation	Technical editing and desktop publishing

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S. Mark Nelson, Research Aquatic Biologist	B.S., Biology, Metropolitan State College, Denver, CO M.S., Fisheries, Colorado State University 20 years experience in the areas of water quality and riparian ecology	Bureau of Reclamation	Aquatic resources analysis Public health analysis (mosquitoes)
John Petrovsky, Contractor	B.A., Psychology, University of California, Los Angeles M.L.A., Landscape Architecture, California Polytechnic University, Pomona 30 years experience as landscape architect and environmental planner	Bureau of Reclamation Washington State Department of Ecology Contractor, John Petrovsky Associates, subcontractor to CH2MHill, Bureau of Reclamation Contractor	Land and shoreline use analysis Public services analysis Transportation analysis Visual resources analysis

Name and Title	Education and Professional Experience	Affiliation	Contribution
Jonathan Platt, Resource Economist	B.S., Business Administration, Bryant College, Smithfield, RI M.S., Agricultural and Resource Economics, Colorado State University 20 years experience in resource economics	Bureau of Reclamation	National economic development analysis
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Larry Vinsonhaler, Contractor	B.A, Economics, University of Pacific, Stockton, California 48 years experience in water resource planning, repayment contracts, and management and administration	Bureau of Reclamation Contractor	Background and History Prior Investigations Joint Alternatives analysis Water resources analysis Hydropower resources analysis
Romeo Wisco, Electrical Engineer	B.S., Electrical Engineering, University of the Philippines Master's Program, Electrical Engineering, University of the Philippines 20 years experience in electric utility system engineering; 15 years experience in hydrology systems modeling	Bureau of Reclamation	Hydropower resources analysis

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Name and Title	Education and Professional Experience	Affiliation	Contribution
Adam Hill, Contractor	B.S., Civil Engineering, Washington State University M.S., Civil Engineering, Washington State University Water Resources Engineer 2 years experience in water resources planning and engineering	Washington Department of Ecology Contractor, Anchor Environmental LLC	Water resources analysis
Paula Johnson, Contractor, Archaeologist	B.A., Anthropology M.A., Museology, University of Washington 16 years experience in cultural resources management	Washington State Department of Ecology Contractor, Paragon Research Associates, LLC	Cultural resources analysis
Brian Mattax, Contractor	B.S., Biology, Purdue University 26 years experience in water resources	Washington State Department of Ecology Contractor, Golder Associates, Inc.	Water quality analysis
Mary McCrea, Contractor	B.S., Microbiology, University of Washington M.S., Environmental Science, Washington State University J.D., University of Puget Sound School of Law 25 years experience in resource management	Washington State Department of Ecology Contractor, Cascadia Law Group	Water rights analysis; Market-Based Reallocation of Water Resources Alternative

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Name and Title	Education and Professional Experience	Affiliation	Contribution
Bob Montgomery, P.E., Contractor	<p>B.S., Civil Engineering, University Washington</p> <p>M.S., Civil Engineering, University Washington</p> <p>26 years experience in water resources planning and engineering</p>	, Washington Department of Ecology Contractor, Anchor Environmental LLC	Lead for State Alternatives
Ernie Niemi, Contractor	<p>M.C.R.P., Harvard University</p> <p>30 years experience in natural resource economics</p>	Washington State Department of Ecology Contractor, ECO Northwest	Socioeconomics analysis; Market-Based Reallocation of Water Alternative
Alyssa Neir, Contractor	<p>B.S., Environmental Studies and Urban Studies, University of Pennsylvania</p> <p>M.W.R., Water Resource Management, University of New Mexico</p> <p>2 years experience as an environmental planner</p>	Washington State Department of Ecology Contractor, Golder Associates Inc.	Groundwater and water quality analyses; Groundwater Storage Alternative
Chris Pitre, Contractor	<p>B.S., Chemistry, Geology, Carleton University, Ottawa, Canada</p> <p>M.S., Earth Sciences, University of Waterloo, Waterloo, Canada</p> <p>Licensed Geologist, Hydrogeology Specialty, Washington State</p>	Washington State Department of Ecology Contractor, Golder Associates Inc.	Groundwater analysis, Groundwater Storage Alternative

Name and Title	Education and Professional Experience	Affiliation	Contribution
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Derek Sandison, Central Regional Director	<p>B.A., Biology Science, Central Washington University</p> <p>M.S., Natural Resource Management, Central Washington University</p> <p>33 years experience in public health, environmental science, environmental planning, and State Environmental Policy Act compliance</p>	Washington State Department of Ecology	SEPA Responsible Official, storage study oversight, and document review
Ken Yocom, Contractor	<p>B.S., Zoology, Eastern Washington University</p> <p>M.L.A., Landscape Architecture</p> <p>Ph.D., Urban Ecology, University of Washington</p> <p>11 years experience as terrestrial and aquatic ecologist</p>	Washington State Department of Ecology Contractor, ESA Adolfson	Vegetation and wildlife, aquatic resources, threatened and endangered species, public services, and land use and shoreline resources analyses

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Indian Tribes

Confederated Tribes of the Colville Reservation, Nespelem

Confederated Tribes and Bands of the Yakama Nation, Toppenish, Yakima

Confederated Tribes of the Umatilla Reservation, Pendleton OR

Confederated Tribes of the Warm Springs Reservation Oregon, Warm Springs

OR

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Federal Agencies

Department of Agriculture

Forest Service, Cle Elum, Naches, Wenatchee

Department of Defense

Department of the Army

Corps of Engineers, Seattle, Portland OR

Yakima Training Center, Yakima

Department of Energy

Bonneville Power Administration, Portland OR

Hanford Site

Office of River Protection, Richland

Richland Operations Office, Richland

Office of NEPA Policy and Assistance, Washington DC

Pacific Northwest National Laboratory, Richland

Department of Commerce

National Oceanic and Atmospheric Administration

National Marine Fisheries Service, Ellensburg, Seattle

Department of the Interior

Bureau of Indian Affairs, Nespelem, Toppenish, Wapato; Lapwai ID;

Pendleton, Portland, Warm Springs OR; Reston VA

Bureau of Land Management, Spokane Valley, Wenatchee, Washington DC

Fish and Wildlife Service, Leavenworth, Richland, Spokane Valley,

Wenatchee, Yakima, Arlington VA

Geological Survey, Tacoma, Fort Collins, CO, Reston VA
Minerals Management Service, Herndon VA
National Park Service, Seattle, Washington DC
Natural Resources Library, Washington DC
Office of Environmental Policy and Compliance, Portland OR,
Washington DC
Office of Surface Mining, Washington DC
Department of Transportation
Federal Highway Administration, Olympia
Environmental Protection Agency, Seattle, Washington DC
General Services Administration, Auburn
Pacific States Marine Fisheries Commission, Portland OR

State and Local Government Agencies

State of Oregon

Office of Energy, Salem OR
Department of Environmental Quality, Portland OR

State of Washington

Central Washington University, Ellensburg
Department Of Ecology, Olympia, Spokane, Yakima
Department of Fish and Wildlife, Olympia, Yakima
Department of Natural Resources, Ellensburg, Olympia
Department of Transportation, Yakima
Historic Preservation Office, Olympia
Hop Growers of Washington, Moxee
Recreation and Conservation Office, Olympia
North Yakima Conservation District, Yakima
State Parks, Olympia
State Parks and Recreation Commission, Olympia
University of Washington, Seattle
Washington House Republicans – Policy Development Department, Olympia
Yakima Learning Institute, Yakima

Local Agencies

Benton County
Clean Air Authority, Richland
Commissioners, Kennewick, Prosser
City of Ellensburg
City of Kennewick
City of Pasco
City of Richland
City of Sunnyside
City of West Richland

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City of Yakima
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 Public Utility District No. 1, East Wenatchee
Grant County
 Public Utility District, Ephrata
Kittitas County
 Commissioners, Ellensburg
Yakima County
 Auditor, Yakima
 Commissioners, Yakima
 Community Services, Yakima
 Planning Department, Yakima
 Surface Water Management, Yakima
 Yakima Basin Planning Unit, Yakima
 Yakima Regional Clean Air Authority, Yakima

**Yakima River Basin Water Storage Feasibility Study Roundtable
Membership**

American Rivers (Michael Garrity), Seattle
Benton County Commissioners (Max Benitz), Prosser
City Of Yakima (Dave Brown, Bill Lover), Yakima
Kittitas County Board Of Commissioners (David Bowen), Ellensburg
Kittitas Reclamation District (Urban Eberhart), Ellensburg
National Marine Fisheries Service (Dale Bambrick), Ellensburg
Roza Irrigation District (Ron Van Gundy), Sunnyside
Sunnyside Valley Irrigation District (James Trull), Sunnyside
Washington Department of Fish and Wildlife (Jeff Tayer), Yakima
Yakama Nation (Phil Rigdon), Toppenish
Yakima Basin Fish and Wildlife Recovery Board (Alex Conley), Yakima
Yakima Basin Storage Alliance (Sid Morrison), Zillah
Yakima Basin Water Resource Agency (Jim Milton), Yakima
Yakima County Commissioners (Mike Leita), Yakima

Irrigation Districts

Cascade Irrigation District, Ellensburg
East Columbia Irrigation District, Othello
Kennewick Irrigation District, Kennewick
Kittitas Reclamation District, Ellensburg
Naches-Selah Irrigation District, Selah
Roza Irrigation District, Outlook, Sunnyside, Yakima
Selah-Moxee Irrigation District, Moxee
Sunnyside Valley Irrigation District, Sunnyside
Union Gap Irrigation District, Wapato

Libraries

Bellevue Regional Library, Bellevue
Benton City Library, Benton City
Carpenter Memorial Library, Cle Elum
Donald K C North Library, Heritage University, Toppenish
Ellensburg Public Library, Ellensburg
Holland and Terrell Libraries, Washington State University, Pullman
James Brooks Library, Central Washington University, Ellensburg
John A Brown Library Media Center, Wenatchee Valley College, Wenatchee
John F Kennedy Library, Eastern Washington University Library, Cheney
Kennewick Library, Kennewick
Kittitas Public Library, Kittitas
Library, Columbia Basin College, Pasco
Max E Benitz Library, WSU Tri-Cities, Richland
Mid-Columbia Library, Kennewick
North Campus Library, Wenatchee Valley College At Omak, Omak
Pasco Library, Pasco
Peterson Memorial Library, Walla Walla University, College Place
Prosser Library, Prosser
Raymond Library and Media Center, Yakima Valley Community College,
Yakima
Richland Public Library, Richland
Roslyn Public Library, Roslyn
Seattle Public Library, Seattle
Sunnyside Public Library, Sunnyside
Toppenish Library, Toppenish
Wapato Library, Wapato
Washington State Library, Olympia
West Richland Library, Richland
Yakama Nation Library, Toppenish
Yakima Valley Regional Library, Yakima

Organizations

American Rivers, Seattle
American Whitewater, Seattle
Auto Dealer's Assoc, Yakima
Center for Environmental Law and Policy, Seattle
Central Washington Building and Construction Trades, Pasco
Citizens for a Clean Columbia, Wenatchee
Columbia Basin Development League, Royal City
Columbia Institute for Water Policy, Spokane
Columbia River Intertribal Fish Commission, Portland OR
Desert Aire Owners Association, Desert Aire
Greenway Auto Mall, Yakima
League of Women Voters of Yakima County, Yakima

Lower Columbia Audubon Society, Richland
National Water Resources Association, Arlington VA
National Wildlife Federation, Seattle
Northwest Power and Conservation Council, Helena MT, Portland OR
Pacific Northwest Council of Carpenters, Yakima
Port Of Benton, Richland
Port Of Sunnyside, Sunnyside
Sierra Club, Seattle
Taxpayers for Common Sense, Washington DC
Washington Cattlemen's Association, Ellensburg
Washington Environmental Council, Seattle
Washington Farm Bureau, Lacey
Washington Trout, Duvall
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Daily Sun News, Sunnyside
Yakima Herald Republic, Yakima

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REFERENCES

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GLOSSARY

GLOSSARY

accretion	The return flow to the stream from surface recharge.
<i>Acquavella</i>	A Yakima River basin water adjudication court case in Yakima County Superior Court.
adjudication	The judicial process through which the existence of a water right is confirmed by court decree.
acre-foot	The volume of water that could cover one acre to a depth of 1 foot. Equivalent to 43,560 cubic feet or 325,851 gallons.
active capacity	The reservoir capacity or quantity of water which lies above the inactive reservoir capacity and is normally usable for storage and regulation of reservoir inflow to meet established reservoir operating requirements.
active recovery	When the recharged groundwater is subsequently recovered by pumping the water back out.
adfluvial spawner	Fish that spawn in tributaries and, as adults, reside in lakes.
alluvial	Composed of clay, silt, sand, gravel, or similar material deposited by running water.
anadromous	Fish that migrate from salt water to freshwater to breed. Going up rivers to spawn.
antecedent flood	A flood or series of floods assumed to occur prior to the occurrence of an inflow flood used to design a specific dam.
anticline	A geologic fold that is convex upward.
appraisal-level design	Designs based on limited analyses, available design data, and professional assumptions, but of sufficient detail to provide satisfactory quantities and preliminary field cost estimates.
appurtenant	An accompanying part or feature of something; accessory.

aquatic biota	Collective term describing the organisms living in or depending on the aquatic environment.
aquifer	A water-bearing stratum of permeable rock, sand, or gravel.
aquifer storage and recovery	A system that injects potable water via wells into aquifers during periods of excess capacity and withdraw the water for municipal supply during periods of peak demand or limited supply.
aquitard	A geologic unit that restricts the movement of groundwater.
average water supply year	A water supply in the Yakima River basin between 2,250,000 and 3,250,000 acre-feet.
bank-full	The water level, or stage, at which a stream or river is at the top of its banks and any further rise would result in water moving into the flood plain.
bathymetric	The study of surfaces under water, such as a river or lake floor.
benthic	Relating to the bottom of a sea or lake or to the organisms that live there.
Biology Technical Work Group	A biologist work group consisting of technical representatives from NOAA Fisheries, U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Washington Department of Ecology, the Yakama Nation, Yakima Basin Joint Board, Yakima Subbasin Fish and Wildlife Planning, and Reclamation's Upper Columbia Area Office and Technical Service Center.
<i>Black Rock Summary Report</i>	<i>Summary Report, Appraisal Assessment of the Black Rock Alternative</i> (Reclamation, December 2004).
cfs	Flow rate in cubic feet per second.
connectivity	The relationship between groundwater and surface water.

cumulative effect	For NEPA purposes, these are impacts to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such action.
<i>de minimis</i>	Latin term for “of minimum importance” or “trifling.”
direct injection with passive recovery	Potable water that is injected into an aquifer during periods of excess capacity and allowed to become part of the natural groundwater system and flow to natural discharge areas (i.e., streams or springs).
dry water year	A water supply in the Yakima River basin less than 2,250,000 acre-feet.
Ecology	Washington State Department of Ecology
emergence	Refers to the fry lifestage of the salmon when they swim up through the substrate from their incubation nest (redd) to live along the stream edge.
endangered species	A species that is in danger of extinction throughout all or a significant portion of its range. To term a run of salmon “endangered” is to say that particular run is in danger of extinction.
entrained	The act of a juvenile fish entering, either passively or actively, a diversion canal at the point of diversion from a stream or entering a pumping plant canal.
Environmental Justice	Environmental Justice is the fair treatment of people of all races and incomes with respect to actions affecting the environment. Fair treatment implies that there is equity of the distribution of benefits and risks associated with a proposed project, and that one group does not suffer disproportionate adverse affects.
Environmental Quality account (EQ)	An account that measures the degree to which the alternative would affect the quality of the natural and cultural resources and ecological systems of the area.

escapement	The act of adult salmon and steelhead successfully arriving at their spawning areas by avoiding harvest and predation
ethnographic	Relating to the branch of anthropology that deals historically with the origin and filiation of races and cultures.
fingerling	A juvenile fish during its first summer after emergence, usually under 3 inches long (see also fry and smolt).
flip-flop	An operational action in the upper Yakima River basin in late summer to encourage anadromous salmon to spawn at lower river state levels so that the flows required to keep the redds watered and protected during the subsequent incubation period are minimized.
flow	The volume of water passing a given point per unit of time.
flow objectives	The desired monthly streamflow used to guide RiverWare model operation criteria. Also used to evaluate alternative performance in terms of how closely they meet the desired monthly streamflow.
fluvial spawner	Fish that spawn in tributaries and, as adults, reside in rivers.
freed-up Yakima River water	Yakima River water currently used by potential exchange participants that would not be diverted by those participants, but would instead be used for instream flow, dry-year proratable irrigation water rights, and future municipal supply needs.
freshet	A great rise or overflowing of a stream caused by heavy rains or snowmelt.
fry	The life stage of fish between the egg and fingerling stages. Depending on the fish species, fry can measure from a few millimeters to a few centimeters in length (see also fingerling and smolt).

habitat	The combination of resources and the environmental conditions that promotes occupancy by individuals of a give species and allows those individuals to survive and reproduce.
Hanford reach	Columbia River reach extending from 15 miles upstream from the mouth of the Yakima River to Priest Rapids Dam.
historic property	Any building, site, district, structure, or object (that has archeological or cultural significance) included in, or eligible for inclusion in, the <i>National Register</i> .
hydraulic conductivity	The rate at which the water can move through an aquifer.
hydraulic grade line	The surface or profile of water flowing out of hydraulic gradient; the slope of the hydraulic grade line is under pressure; the hydraulic grade line is the actual level to which water would rise in a small vertical tube connected to the pipe.
hydraulic gradient	The slope of the surface of open or underground water.
Hyd-Sim	The Bonneville Power Authority computer model used as the hydrologic basis for the 2000 Biological Opinion; it includes the significant United States Federal and non-Federal dams and the major Canadian projects on the main stem Columbia River and its major tributaries.
hyporheic invertebrates	Aquatic insects that complete all or a portion of their lifecycle beneath the riverbed.
in situ	With reference to cultural resources, an object, feature or strata situated in its original, meaningful depositional context; undisturbed.
inactive capacity	the reservoir capacity or quantity of water which lies beneath the active reservoir capacity and is normally unavailable for withdrawal because of operating agreements or physical constraints.

Indian sacred site	A specific, discrete, narrowly delineated location on Federal land that is identified by an Indian Tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion.
Indian trust assets (ITA)	ITAs are legal interests in property held in trust by the United States for Indian Tribes or individuals. They are rights that were reserved by or granted to American Indian (Indian) Tribes or Indian individuals by treaties, statutes, and executive orders. These rights are sometimes further interpreted through court decisions and regulations.
instream flows	Water flows for designated uses within a defined stream channel, such as minimum flows for fish, wildlife, recreation, or aesthetics.
integrated alternative	An alternative after it has been added to the No Action Alternative (existing Yakima Project plus YRBWEP conservation measures) for operation, maintenance, and management.
interbed	Term given to the sediments deposited between basalt flows in the Columbia Plateau Basalt Group.
interflow	Term given to the zone where most of the lateral groundwater flow occurs in the Columbia River basalts. Consists of a combination of the permeable bottom of one basalt flow and the adjacent flow top of the underlying basalt flow.
k	Hydraulic conductivity.
Kh	Horizontal hydraulic conductivity
liquefaction	A loss of material strength during earthquake shaking that can result in large areas of slope failure or settlement of the ground surface.
littoral zone	The area between the high and low water marks.

metamorphic rock	Refers to rocks that have changed in form from their original rock type (sedimentary or igneous) in response to extreme changes in temperature, pressure or chemical environment. For example: limestone into marble.
million acre-feet	The volume of water that could cover 1 million acres to a depth of 1 foot.
National Economic Development account (NED)	An account that measures how the alternative would yield positive changes in the economic value of the national output of goods and services.
natural (unregulated) flows	The flow regime of a stream as it would occur prior to development, that is, the predevelopment landscape, with a flow regime similar to that defined for unregulated flows.
natural flow	River flow that originates from a source other than reservoir storage.
nonprorated water rights	Pre-Yakima Project senior water rights related to natural flows that are served first and cannot be reduced until all the proratable rights are regulated to zero.
normative flows	Flows that mimic the natural frequency, duration, and magnitude in the rise and fall of the river stage to the greatest extent possible given the cultural, legal, and operational constraints associated with river basin development.
oligotrophic	Lacking plant nutrients and usually containing plentiful amounts of dissolved oxygen without stratification.
operation criteria	Rules used in the RiverWare model specific to each alternative that dictate how Yakima basin flow is used to address irrigation and instream flow objectives
Other Social Effects account (OSE)	An account that measures the extent and magnitude to which the alternative would affect the quality of life and social well-being in the area.
overburden	A thick deposit of sediments overlying bedrock.

passerine	Of or relating to the largest order of birds, which includes over half of all living birds and consists chiefly of songbirds of perching habitats.
passive recovery	Recharging water (placing water in) the aquifer system and allowing it to become part of the natural groundwater system and flow to natural discharge areas (i.e., streams or springs). The water is “recovered” when it reaches the stream and is available for instream or out-of-stream uses.
phreatic	Free-standing water level; surface water level.
<i>Principles and Guidelines (P&Gs)</i>	<i>Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies.</i>
prorated water rights	Newer junior water rights related to storage water that, in water short years, receive less than their full right on a prorated basis.
Reclamation	U.S. Department of the Interior, Bureau of Reclamation.
redd	The nest that a spawning female salmon digs in gravel to deposit her eggs.
Regional Economic Development account (RED)	An account that measures the degree to which the alternative would affect the region’s income, employment, population, economic base, and social development.
riparian	Relating to, living in, or located on a water course.
RiverWare (Yak-RW)	Yakima Project RiverWare model; a daily time-step reservoir and river operation computer model of the Yakima Project created with the RiverWare software.
Roza Division	Division of Yakima Project comprised of Roza Irrigation District.
Roza Powerplant	The existing powerplant located at Roza Canal mile post 11.
sediment	Any very finely divided organic or mineral matter deposited by water in nonturbulent areas.

shoal	A place where the water of a sea, lake, river, pond, etc., is shallow; a shallow.
shrub-steppe	A vegetation type consisting of a mix of woody shrubs, grasses, and forbs, generally dominated by Wyoming big sagebrush and blue bunch wheatgrass.
slopewash	Soil and rock material that has moved downslope, assisted by running water that is not channelized.
smolt	Adolescent salmon or steelhead that are undergoing changes preparatory for living in salt water. Usually 3 to 7 inches long (see also fry and fingerling).
spawner	Adult salmon that has left the ocean and entered a river to spawn.
specific yield	The potential storage in an unconfined aquifer
Storage Study	Yakima River Basin Water Storage Feasibility Study; a multiyear evaluation of the viability and acceptability of several storage augmentation alternatives, including a potential water exchange, for the benefit of fish, irrigation, and municipal water supply within the Yakima River basin.
Storage Study Technical Work Group (SSTWG)	A fisheries biologist work group formed to assist on fishery technical matters related to the Storage Study.
storage water	Water that has been stored and purposefully released.
storativity	The potential storage in a confined aquifer
Stream Depletion Factor (SDF)	The time when 28 percent of the recharge has accrued to the stream (Jenkins, 1968)
Sunnyside Division	A division of Yakima Project comprised of Sunnyside Valley Irrigation District and eight other irrigation districts, companies, and cities.
surface recharge with passive recovery	Diverting and infiltrating surface water into a recharge basin during periods of high streamflow and allowing it to discharge naturally back to a stream.

System Operations Advisory Committee (SOAC)	Committee comprised of the Yakima Basin Joint Board, Yakama Nation, Washington State Department of Fish and Wildlife, U.S. Fish and Wildlife Service.
target flows	Flows quantified in Title XII of the Act of October 31, 1994, for two points in the Yakima basin (Sunnyside and Prosser Diversion Dams)
taxa	A grouping of animals or plants that share a common set of physical and/or life history characteristics.
terrestrial	Of or relating to land as distinct from air or water.
thalweg	The thalweg is a line drawn along the entire length of a streambed that defines the deepest part of the river channel. The thalweg is almost always the line of fastest flow in any river.
threatened species	A species that is likely to become endangered within the foreseeable future.
Title XII target flows	Specific instream target flows established for Yakima project operations at Sunnyside and Prosser Diversion Dams by Title XII of the Act of October 31, 1994 (Public Law 103-464)
toe plinth	A concrete pedestal or footing located beneath the base of a dam's concrete face.
total capacity	The total reservoir capacity or quantity of water which can be impounded in the reservoir below the maximum water surface elevation.
Total Water Supply Available (TWSA)	The total water supply available for the Yakima River basin above the Parker gage for the period April through September.
Traditional Cultural Property (TCP)	A property "that is eligible for inclusion in the <i>National Register</i> because of its association with cultural practices or beliefs of a living community that (a) are rooted in the community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King, 1998).

transmissivity	The product of the thickness of the aquifer unit and the hydraulic conductivity.
ungulate	A four-legged, hoofed animal.
unregulated flows	The flow regime of a stream as it would occur under completely natural conditions; that is, not subjected to modification by reservoirs, diversions, or other human works.
vesicular basaltic rock	Rock that contains many small holes or cavities formed as the rock solidifies.
viremic	The presence of viruses in the blood.
wasteway	A channel for conveying or discharging excess water.
water year	The 12-month period from October through September. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. For example, the year ending September 30, 1992 is called the "1992 water year."
watershed	The total land area draining to any point in a stream.
wet water year	A water supply in the Yakima River basin greater than 3,250,000 acre-feet.
wetland	Generally, an area characterized by periodic inundation or saturation, hydric soils, and vegetation adapted for life in saturated soil conditions.
<i>Yakima Alternatives Appraisal Assessment</i>	<i>Yakima River Basin Storage Alternatives Appraisal Assessment</i> (May 2006).
Yakima fold belt	One of three informally designated physiographic subprovinces of the Columbia Plateau. Consists of northwest-southeast-trending ridges (anticlines) separated by broad, flat valleys (synclines) that were folded and faulted under north-south compression.